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BOSTON SOCIETY OF CIVIL ENGINEERSFOUNDED 1848

PROCEEDINGS

PAPERS IN THIS NUMBER.

"The Origin of Camp Brooks and the Open-Air Treatment of Influenza." William A. Brooks.

"The Influenza Pandemic — Cause, Preventive Measures and Medical Treatment." Thomas F. Harrington.

"The Influenza Epidemic at the Receiving Ship, Commonwealth Pier, and the Naval Camp at Framingham." R. W. Mathes.

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MINUTES OF MEETINGS.

BOSTON, November 20, 1918. — A regular meeting of the Boston Society of Civil Engineers was held this evening at Chipman Hall, Tremont Temple, and was called to order by the President, Charles M. Spofford, at 8 o'clock.

There were 110 members and visitors present.

The record of the September meeting was approved as printed in the October JOURNAL. The Secretary reported for the Board of Government the election to membership of the following candidates:

Members — Messrs. S. Ross Berkowitz, Bion A. Bowman, Carroll Andrew Farwell, John Charles Garvey, James Edward Hanlon and Murray Holman Mellish.

Junior — Mr. Ernest Palmer Giles.

The President announced that an invitation had been received for the members of the Society to join in a meeting of the British Educational Mission to the United States and the Society for the Promotion of Engineering Education, to be held at the Massachusetts Institute of Technology, on December 6 and 7.

The President also announced the deaths of the following members of the Society.

George M. Stevens, died September 19, 1918.

Leslie P. Reed, died September 26, 1918.

George R. Burnes, died October 3, 1918.

Charles H. Dodd, died October 27, 1918.

By vote the President was requested to appoint committees to prepare suitable memorials.

The Secretary presented for the committee appointed for the purpose, consisting of Messrs. T. P. Perkins, Frank B. Rowell and Charles H. Restall, a memoir of Frank S. Hanf, a member of the Society, who died April 28, 1918. By vote the memoir was accepted and ordered printed in the JOURNAL.

The President then introduced Mr. William T. Donnelly, of New York City, who gave a most interesting talk illustrated with lantern slides, entitled, "Pontoon Floating Dry Docks, their Construction and Use."

A discussion followed the reading of the paper, in which Past Presidents FitzGerald and Hodgdon and other members took part.

By a unanimous vote the thanks of the Society were extended to Mr. Donnelly for his courtesy in presenting the paper of the evening.

The President called attention to the fact that one of the members of our Board of Government who went over to France with Pershing's first 100 000, has just returned, and, as he has had an opportunity to see a few things in France, he would ask Major Lewis E. Moore to speak to us for a few moments.

Major Moore said in part:—

It is a far cry from Château-Thierry to this hall, and much that has happened since I stood here last seems like a dream, but it is good to be back again among my friends. There is not very much I can tell you, perhaps, that you have not read, and which it would be proper for me to say under existing

conditions. I will try for two or three minutes to give you some idea of what will be met with in the necessary reconstruction work in France. Who will do that reconstruction work it is difficult to say. However, I will try to tell you in five minutes a small part of what I myself have seen, and will take for that purpose what was one of the most thriving cities in France, where perhaps the German has vented his utmost spite upon the most beautiful specimen of Gothic architecture that was left in France or in the world. One day, shortly after the fight at Château-Thierry, I had occasion to go up in the general vicinity of this cathedral and I took the opportunity of going through the city of Rheims with several other officers. For the benefit of those who are no better informed than I was, I would say that before the war this city had a population of about 115 000 and was one of the principal centers of the champagne industry in France. Owing to the German lines being on both the north and east of the city, it was necessary to enter in at the south side of the city and then go up through the city and leave on the west side. On the way through we passed numerous places where demolished buildings apparently blocked the streets, but we always found that a sufficient way was clear so that our machine would go through, though often by a winding path. We went to the Hôtel de Ville. There was nothing left but the front wall and the steps. The whole interior and all the rear portion is gone. From there we went around to where the cathedral stands in its tattered beauty, and I wish I had the words to convey to you the ruin that has there been wrought. The shells have struck it in many places. The buttresses in the rear are badly damaged, but perhaps the worst damage has been done by the incendiary shells which set it afire. The interior is of course very much blackened by the fires, the roof has fallen in, and of the beautiful windows nothing remains. Much of the delicate stone carving is gone. Many of the images around the cathedral are damaged by shrapnel and by high explosives, but perhaps the worst feature connected with the fire is that the stone of which the cathedral is built has been calcined to such an extent that the rains are washing it away. The cathedral is beautiful still—what is left of it—and it must have been wonderful to begin with, but it is probably ruined beyond the possibility of reconstruction. Such monuments as the cathedral are irreplaceable and the damage is irremediable. I do not see how they can have the heart to try to replace it. We were in the city probably two hours. In all that time we heard no sound except the swish of our tires on the pavements and an occasional shell exploding. We saw no house that had not been struck, and in the whole city the only living things we saw were three French soldiers. There was not a cat, a dog, or a bird living in the place. It was absolutely a city of the dead. And that is the kind of destruction wrought in France, and that is what the French people have got to recover from. Reconstruction to a certain extent is impossible, although the French are trying to reconstruct their homes. Although they have no word for it in their language, they have a great love of home; and all through that district, where most of the human dead had been buried, but practically none of the horses—

all through that district, with its indescribable smell of the battlefield, people were gradually drifting back to what was left of their homes. Here and there you would see a man and three or four women gathered in a dispirited manner around what had been their home, the roof perhaps blown off, a wall gone, what was left of their household goods burned, soaked and ruined, the floors broken, the effects of shellfire and machine guns everywhere in evidence, and they would be trying to figure out some way to patch their poor home together. And if I have conveyed to you any poor idea of the tremendous task ahead of the French people in replacing all these hundreds of villages which are in as bad or worse shape than those where I have been, perhaps I will have given you a faint conception of the problem that the French have before them.

Adjourned.

S. E. TINKHAM, *Secretary*.

BOSTON, November 15, 1918. — A postponed regular meeting of the Sanitary Section of the Boston Society of Civil Engineers was held this evening in the library of the Society, Tremont Temple.

The meeting was called to order at 8 o'clock P.M., with the chairman presiding.

The first speaker of the evening, Lieut.-Col. William A. Brooks, Acting Chief Surgeon, M.S.G., gave a very interesting description of Camp Brooks Hospital on Corey Hill, why the hospital was established at this point, and his method of open-air treatment.

The next speaker, Major Thomas F. Harrington, Chief Medical Officer, Medical Corps, M.S.G., described the cause of the epidemic and the methods employed to combat the disease.

Lieutenant Mathes, who has charge of the Naval Hospital Camp at Framingham, told of the progress of the disease among the naval forces around Boston.

A stenographic record of the meeting was made.

Twenty-five members and guests were present.

The meeting adjourned at 9.45 o'clock.

HENRY A. VARNEY, *Clerk*.

APPLICATIONS FOR MEMBERSHIP.

[December 10, 1918.]

THE By-Laws provide that the Board of Government shall consider applications for membership with reference to the eligibility of each candidate for admission and shall determine the proper grade of membership to which he is entitled.

The Board must depend largely upon the members of the Society for the information which will enable it to arrive at a just conclusion. Every member is therefore urged to communicate promptly any facts in relation to the personal character or professional reputation and experience of the candidates which will assist the Board in its consideration. Communications relating to applicants are considered by the Board as strictly confidential.

The fact that applicants give the names of certain members as reference does not necessarily mean that such members endorse the candidate.

The Board of Government will not consider applications until the expiration of twenty (20) days from the date given.

DEPUY, CLARENCE SCHUYLER, Washington, D. C. (Age 29, b. Deadwood, S. D.) Educated in public schools, including Technical High School, Washington, D. C., and through private study. Experience to September, 1910, with Bureau of Yards and Docks, U. S. Navy Dept.; from September, 1910, to May, 1918, with William L. Miller Co.; on May 6, 1918, was commissioned 1st lieutenant in construction division, U.S.A., and assigned to position of assistant supervising constructing quartermaster on Army Supply Bases, Boston, Mass., and Brooklyn, N. Y.; received captain's commission on August 24, 1918, since which date has been assistant supervising constructing quartermaster on Army Supply Bases, Boston, Mass., Brooklyn, N. Y., and New Orleans, La., and on Depot Warehouses, Baltimore, Md. Refers to F. H. Fay, C. R. Gow, W. F. Kearns, J. W. Rollins and C. M. Spofford.

WOODS, WALTER AUGUSTINE, Somerville, Mass. (Age 22, b. Somerville, Mass.) Student for two years at Lowell Institute, 1914-16, Buildings Course; for one year at Franklin Union, 1916; and has taken one year I. C. S. course in railroad engineering, 1916-17. Began work in 1913 with H. P. Converse & Co. as general helper in drafting room; for one and one-half months in 1914 worked making plans of gas mains for Arlington Gas Co.; in 1915, with H. P. Converse & Co. in Baltimore as concrete form inspector; from

September, 1915, to date, with B. & M. R. R. Co., having served as chainman, water inspector, inspector of bridges and buildings, assistant to supervisor of bridges and buildings and transitman, which rating he now holds, while performing duties of assistant engr., Terminal Division. Refers to E. P. Bliss, N. C. Burrill, S. P. Coffin, R. H. Parke and J. J. Rourke.

ROLL OF HONOR.*

ADDITIONS.

- † BAKER, LLOYD E. U. S. N. R. F., Fleet Storehouse, 20 Washington St.
Newport, R. I.
HALEY, F. WILLIAM. Utilities Dept., Camp Devens, Mass.
HOWARD, DAVID R. 1st Lieutenant, Co. I, Sec. A, E. O. T. S., Camp A. A.
Humphreys, Va.

REVISIONS

- BALCH, WILLIAM H. Major, Engrs., A. P. O. 717, Am. Ex. Force, France.
CYR, JOHN P. Officers' Training School, Engr. Section, Am. Ex. Force,
France.
EICHORN, FREDERICK C. H. 1st Lieutenant, Q. M. C., 421st Labor B'n,
Camp Sheridan, Ala.
KIMBALL, Capt. HERBERT S. 75 State St., Boston, Mass.
† NOLAN, CONRAD. 2d Lieutenant Engrs., U. S. A., 8th Engr. Training
Reg't, Camp Humphreys, Va.
THOMPSON, SANFORD E. Lieutenant-Colonel, Ord. Dept., U. S. A., Office of
Chief of Ordnance, Washington, D. C.

LIST OF MEMBERS.

ADDITIONS.

- BOWMAN, BION A.,
Care Fay, Spofford & Thorndike, 308 Boylston St., Boston, Mass.
GARVEY, JOHN C. 70 Royal St., Lowell, Mass.
GILES, ERNEST P. 308 Newbury St., Boston, Mass.
HANLON, JAMES E. 134 Millet St., Dorchester, Mass.
IVERSON, THOMAS. 9 Shepard Ave., Roxbury, Mass.
MELLISH, MURRAY H. 174 Ferry St., Malden, Mass.

* Members who are in the service and have not yet reported that fact to the Secretary are earnestly requested to do so, stating branch of service, rank and military address.

† Home address given below in "List of Members."

PROCEEDINGS.

7*

CHANGES OF ADDRESS.

ATWOOD, THOMAS C.,	U. S. Shipping Board, 608 Lexington Bldg., Baltimore, Md.
BAKER, LLOYD E.....	51 Congress Ave., Providence, R. I.
BARRETT, ROBERT E.....	12 Marshall St., Turners Falls, Mass.
BELL, FRANK C.....	32 Spring St., Malden, Mass.
KEITH, HERBERT C.....	13 Park Row, New York, N. Y.
MANN, WILLIAM H. G.....	5 Maple St., Hanover, N. H.
NELSON, WILLIAM.....	93 Court St., Laconia, N. H.
NOLAN, CONRAD.....	1715 Hill St., Jacksonville, Fla.
PRATT, C. BARTON.....	Clark Road, Hingham, Mass.
SAMPSON, GEORGE T.....	234 Main St., Medford, Mass.
SMITH, SIDNEY.....	76 White St., E. Boston, Mass.

DEATH.

BURNES, GEORGE R.....	October 3, 1918
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EMPLOYMENT BUREAU.

THE Board of Government maintains an employment bureau for the Society, to be a medium for securing positions for its members and applicants for membership, and also for furnishing employees to members and others desiring men capable of filling responsible positions.

At the Society room two lists are kept on file, one of *positions available* and the other of *men available*, giving in each case detailed information in relation thereto.

MEN AVAILABLE.

427. Age 33. High-school education. Has had fifteen years' experience as instrumentman and assistant engineer; experience includes municipal and railroad work.

428. Age 25. High-school education. Has had five years' experience as rodman, inspector, transitman, etc.

430. Age 33. Graduate of Brown University, 1907, civil engineering course, degree of B.S. Has had more than ten years' experience, including one year as junior engr. with U. S. Geological Survey on stream gaging, water power investigations and reports, and about eight years with U. S. Reclamation Service as junior, assistant and cost analysis engr. respectively, on canal location, estimates and designs for irrigation structures, experimental investigations on flow of water, seepage and evaporation studies and assembling and

analyzing of costs; has commission as captain, engrs., U. S. A.; is associate member, A. S. C. E. Desires position as cost analysis or efficiency engineer. Salary desired, \$200 per month.

LIBRARY NOTES.

RECENT ADDITIONS TO THE LIBRARY.

U. S. Government Reports.

Analyses of Mine and Car Samples of Coal Collected in Fiscal Years 1913 to 1916. Arno C. Fieldner and others.

Climate and Plant Growth in Certain Vegetative Associations. Arthur W. Sampson.

Convenient Multiple-Unit Calorimeter Installation. J. D. Davis and E. L. Wallace.

Plan for Development of Village of Grand Canyon, Ariz. Frank A. Waugh.

Quick Determination of Incombustible Matter in Coal and Rock-Dust Mixtures in Mines. A. C. Fieldner and others.

Statistics of Railways in United States for 1915-16.

Temperature-Viscosity Relations in Ternary System $\text{CaO-Al}_2\text{O}_3\text{-SiO}_2$. Alexander L. Feild and P. H. Royster.

Weights of Various Coals. S. B. Flag.

State Reports.

Massachusetts. Annual Report of Homestead Commission for 1917.

Massachusetts. Report to Public Service Commission on Methods and Practices of Boston Elevated Railway Company, 1917. John A. Beeler.

Rhode Island. Annual Report of Public Utilities Commission for 1917.

Wisconsin. Soil Surveys of Northeastern Wisconsin, Jefferson County, Columbia County and North Part of North Central Wisconsin, accompanied by portfolio of maps. A. R. Whitson and others.

Municipal Reports.

Hartford, Conn. Annual Report of Water Commissioners for 1916-17.

Providence, R. I. Annual Report of City Engineer for 1917.

Somerville, Mass. Annual Reports of City Officers for 1917.

Miscellaneous.

American Society for Testing Materials: Standards, 1918.

American Society of Municipal Improvements: Transactions for 1917-18.

Bridge Inspection and Reports, with Special Reference to Bridges for Electric Railway Traffic. Herbert C. Keith.

LIBRARY COMMITTEE.

BOSTON SOCIETY OF CIVIL ENGINEERS
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PAPERS AND DISCUSSIONS

This Society is not responsible for any statement made or opinion expressed in its publications

**THE ORIGIN OF CAMP BROOKS AND THE OPEN-AIR
TREATMENT OF INFLUENZA.**

BY LIEUT.-COL. WILLIAM A. BROOKS, CHIEF SURGEON, M.S.G.*

(Presented before the Sanitary Section, November 15, 1918.)

FOR a man who has devoted most of his professional life to surgery and the study of surgical problems I feel out of place in addressing the Sanitary Section of the Boston Society of Civil Engineers.

The open-air treatment was forced upon me and upon my friends, members of the medical corps of the State Guard.

The origin of the first camp hospital (Fig. 1) was due to the fact that some little time ago I had accepted the position of medical director of the recruiting service of the Shipping Board. We had organized a good corps of doctors, and everything went well until there came a rumor of influenza. There was some in Russia and some in this country, and in talking it over with Dr. Croke, the medical officer in charge at East Boston, I told him to be on his guard against it, and if he found a case to insist that everything coming in contact with that patient be disinfected and that the nurse in attendance wear a mask. At that time we had gathered together on the ships between 5 000 and 6 000 men.

One Friday morning Dr. Croke telephoned me that he

* Brooks Hospital, Corey Hill, Brookline, Mass.

thought he had one or two cases of influenza, and we again talked over precautions to be taken in regard to it. On the following Monday morning he telephoned me that he thought they were all getting sick, so I went over to East Boston and through some of the ships, and found many men stricken and lying on the decks and in their bunks. My first impulse was to get away as soon as possible—and I followed that impulse. I went to Boston and saw Mr. Howard, director of the Shipping Board, and told him of the situation, and he asked me what I would



FIG. 1. FIRST CAMP HOSPITAL AT COREY HILL, BROOKLINE, MASS.

advise. I said, if possible, make arrangements with the state authorities and establish a camp hospital. I knew that the hospitals in Boston at that time were pretty well congested, and did not see how we could possibly place as many sick persons as we had. Having obtained Mr. Howard's consent to the plan, I conferred with the Adjutant-General, telling him that the Shipping Board would pay the expense, whereupon he ordered out the State Guard. At 2.30 o'clock in the afternoon, Colonel Emery, quartermaster-general of the state of Massachusetts, received instructions to send tents and supplies to Corey Hill,

and at the same time I ordered out the Medical Corps. That night, about 5.30 o'clock, the tents arrived, and before midnight we had them erected, sewerage connections made, and the water supply turned on. By 12.30 A.M. there were 38 patients in tents, and from that time the camp grew very rapidly, the problems increasing as fast as the camp grew. We had some very bad weather for three or four days, and then we commenced to get deaths. We tried everything we knew of, and felt very much discouraged. At the meetings of the medical staff, we concluded



FIG. 2. SHOWING HOW PATIENTS WERE PLACED IN THE OPEN AIR.

we had struck something serious, but we did not know exactly what, as ordinary remedies did not seem to affect the patients favorably. Combined with the wet weather the situation was extremely depressing. Dr. Slack and Dr. Overlander made some studies and, as Dr. Harrington will tell you, they found that there was a mixed infection including many kinds of bacilli; the bacillus of influenza, at least three types of pneumococci, the streptococci, and later the diplococci. I can only compare the situation to that of a man who takes two or three cocktails

before dinner, several kinds of wine with his dinner, and after it a cordial, and then drinks Scotch and soda all the evening.

However, we soon began to get some light. A report from post-mortem examinations from the Naval Hospital stated that they found the men died because they couldn't get enough air, and the physicians reported the finding of abscesses in the lungs. They also found most of the hearts normal. Then Dr. Harrington found that the worst cases came from the holds in the ships where the air was the poorest. One case I have in mind, who came from the hold of one of the ships, died two or three hours after reaching camp.

After observing these facts, the problem was comparatively simple. We just put the patients out in the open (Fig. 2), where they could get all the air there was. The night of the first day after we had put the patients out into the open, we found, almost without exception, that they had lower temperatures than they had had in the morning, showing most decidedly the effect of plenty of fresh air and sunshine. We took courage, and whenever we could we put the patient out into the air. I think the results justify the treatment.

We met with all kinds of opposition and criticisms. One of the leading physicians of Boston made complaint to the State Board of Health that we were abusing our nurses and treating our patients cruelly. The State Board of Health investigated and found no ground for the complaint.

One morning, after a very stormy night, I was called up by a gentleman who said that he wanted to tell me I was the most cruel man in the world because I had kept those boys out in the cold and rain, and that I ought to be shot, or something to that effect. Although I invited him to put on his coat and come up and look the camp over, I have never seen him and do not even know who he is.

The tents were so well ditched that they were dry, and the boys were extremely comfortable in them. The only ones who really suffered were the doctors and nurses, who were obliged to go from tent to tent in all sorts of weather, attending to the patients.

As soon as we found out what the fresh air really did for

our patients, as I have said before, we took courage and followed this course of treatment for five or six weeks.

A COMPARISON OF RESULTS.

One Sunday I walked into a general hospital of a city where there was a question whether it would be advisable to establish a tent hospital, and where they had eighteen or twenty in one ward, and was informed by the physician in charge that their patients were doing very nicely. He said they had only had four deaths the night before. I saw a number of young ladies going in as volunteer nurses and was invited into the ward. I thanked them, but firmly declined the pleasure. That was on Sunday. On the following Wednesday I went to this same city and was informed that in three days 20 of the patients in this hospital had died and 17 of the nurses were down sick. Now compare for a moment that record with the record of the most successful tent hospital we had, — that at Barre, Mass., — where cases were sent in early. We treated there 114 cases and had but 4 deaths. I could make many more comparisons where cases were just crowded together, eighteen or twenty in one room, and where they were treated out of doors in tents or shacks, and I think the comparison would be most satisfactory from my standpoint. As a matter of fact, the death rate ranged from 30 per cent. to 50 per cent. for indoor treatment in most hospitals, while out of doors our highest death rate was 18 per cent.

One thing which mitigated against our percentages was the fact that a great many physicians who did not believe in the treatment would send in patients as a last resort. They would keep them until they were nearly dead and then send them to the tent hospital. The records show that a great many of the cases accepted died within forty-eight hours after admission. This was not giving the open-air treatment a fair show.

To go back to the history of the first tent hospital. Out of between 5 000 and 6 000 men on the ships, we had some 1 200 cases of influenza. Out of the 1 200, we treated 351 of the worst cases, and of this number 35 died.

MASKS.

The use of masks is based upon Rosenthal's experiment of making a solution of the "bugs" and allowing it to run through ordinary filter paper. The fluid which comes through is perfectly free from bugs; in other words, you cannot get cultures from it. To filter the air is the reason for wearing masks. Layers of gauze have been taken from masks which have been used near the patients, and bacilli have been found on them. In working around the patients, after two or three hours, the gauze becomes infected and consequently has to be changed. Rosenthal himself, in working over bacilli for hours at a time, only takes the precaution of wearing a wire mask covered with several layers of gauze, and after working washes his hands in a 1/1000 solution of corrosive sublimate, or triple lysol. He has clearly demonstrated that any one who takes these precautions can avoid contagion.

GROUND FOR OBJECTION TO TREATING INFLUENZA IN WARDS.

Why should cases of influenza be separated from each other, and what is the safe distance? I have been told of a series of experiments conducted at the Massachusetts Institute of Technology where the lecturer placed in front of him agar plates in series up to 8 ft. and then filled his mouth with a harmless collection of "bugs." He delivered his lecture — talked, yelled and spoke as loudly as he could. At the end of his lecture the agar plates were developed and, as I remember it, growth was obtained up to a distance of 6 ft. — which would be approximately the distance a man might drive droplets. Therefore the safe distance for one patient to be from another would be about 7 ft. A ward of 20 beds would require a very large room, and still the nurses would be seriously exposed. In some schools it was observed that where one child would come suffering from influenza there would in a few days be an adjacent vacant area around that child's desk, showing that the nearest ones had become infected. This is, I think, one of the best reasons for closing the schools during an epidemic such as we have just been through.

But what I should like to know is, Why does the farmer, out in the country, who is not within a mile of a droplet, who hasn't been into town for months, come down with influenza? I'd also like to know why at sea, after the ship has been out six or seven days, men will come down with influenza? Why does it travel from east to west? Why does it go to sleep for a whole year and then wake up again in the fall? As for this particular epidemic, I should like to know why we get such a mixture of organisms, which made it so especially serious. These are the questions which ought to be answered. Has the climatic condition much to do with it? Why should such an epidemic as we have had suddenly spring up in one place and then move on to the next and reach its height in from ten to fifteen days?

The period of incubation is about two days, and yet it has traveled across the continent very quickly. So there still remain a great many problems about an epidemic of this kind, which will need a great deal of study in order to make them understood. Arguing from what has happened in the past, we shall probably have, next fall, another epidemic similar to this but not as severe, and the next year another but still lighter one. We learned that out of twenty men examined, one was a carrier. Now, if he is a carrier, why does he not continue to transmit the disease right along? Why does he wait until the next fall? These questions greatly puzzle one.

Of one thing I am convinced, — that hospital wards are not the places for the treatment of influenza. Up to the time that I went into the study of this big epidemic, I believed in the big hospitals. I believed that the wards were fine. To-day I am convinced that wards in hospitals are absolutely dangerous for diseases of the respiratory tract, and that they should be done away with. I am not sure that this is not true of other diseases besides influenza and pneumonia. We are coming to a time when our infectious diseases will be treated with not more than two patients in one room. If one man develops something very serious with another patient in the room, it is bad enough to move one, whereas if you have a room with twenty patients it is far worse to move nineteen.

One bad thing about the tent hospital is that the space at the top becomes foul, and there is no way of introducing ventilation there, and also the doctors and nurses are tremendously exposed in passing from tent to tent. Therefore I thought of cubicles 9 ft. by 9 ft., facing south, with a passage on the north side that would be heated. Here the attendants would not be exposed. The fronts of the cubicles can be made so that they can be opened out and the beds slipped out on to the ground or on to a platform.

BOSTON SOCIETY OF CIVIL ENGINEERS
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PAPERS AND DISCUSSIONS

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THE INFLUENZA PANDEMIC — CAUSE, PREVENTIVE
MEASURES AND MEDICAL TREATMENT.

BY MAJOR THOMAS F. HARRINGTON, CHIEF MEDICAL OFFICER,
M.C., M.S.G.*

(Presented before the Sanitary Section, November 15, 1918.)

I AM glad your presiding officer said I would tell you what is known about this disease, because that would take so much less time than to attempt to tell what we do not know about it. It would be a tiresome and discouraging story to tell the things which we do not know to-day, even after our great experience of the past two months or so. Historically, influenza is very old. There are well-authenticated data of pandemics of influenza going back into the fifteenth and sixteenth centuries. The present pandemic is the fifth within one hundred years. There was one in 1830-33, another in 1836-37, a third in 1847-48, and one comparatively recently which most of you will remember, — in 1888-89. A peculiar coincidence is that in most previous epidemics it was called cholera or plague. In the history of the town of Boston, a good description of the present epidemic of grippe, under the name of cholera, shows that at that time (1830-33) they recognized the contagious and infectious nature of this disease, but it was linked up with the story

* Medical Deputy Commissioner of State Board of Labor and Industries, 1 Beacon Street, Boston, Mass.

of the great pestilences and great waves of destruction of life that have come down to us from very ancient times. It is a curious coincidence that in most pandemics the trouble has started in the Far East. The recent epidemic of 1888-89 reached Moscow in the spring of 1889; in the summer it reached Petrograd; then Berlin; then London and Paris; and we received it about Christmas time of that year — which some of you may remember. It is a peculiar fact that in all the discussion and doubt about the present epidemic we seem to have lost sight of some very important facts. So far as the censorship allowed, we have read that the armies of Europe were being attacked during the past year by a peculiar epidemic of a mysterious nature, at one time taking the form of pneumonia — so-called infectious pneumonia — at another time encephalitis; at another time and very often, called by the name influenza. The reports which have been coming to us quite recently from Germany state that the Germans blame the Chinese imported for work behind the lines for bringing them the disease a year ago, when it crippled the German army. The Austrians say they got it from the Americans, a small force of whom were then in close proximity. Whereas the disease is sometimes called "Spanish gripe," the Spanish people are very much wrought up over the suggestion that it originated there, and say that they first received it from Germany. Whereas the French army say they got their first case from Sweden. The fact that I want to bring home is that this disease is nothing new; that our surgeons and physicians have been commenting upon it for over a year. A whole section of the British Medical Association convention last summer was given up to a discussion of this disease which we now accept under the name of "gripe."

Dr. Brooks has touched upon many facts that we do not know and cannot explain. One very significant recent observation touches this Society intimately, — namely, the so-called shell shock of the trenches. Similar conditions of the brain are found after death from shell shock, and from carbon monoxide poisoning. This suggests some chemical agent as the factor in shell shock. I believe that the members of the medical profession will come to members of the chemical and bacteriological

sciences and ask that this and kindred diseases be studied, not alone from the medical point of view but from the point of view of the bacteriologist and the chemist working jointly.

Coming back to the cases of influenza in this country, it is generally understood that those cases among sailors at South Boston and East Boston in August were the first in the East — practically the first in the United States. The Boston *Herald* of March 18, 1918, however, stated that a mysterious disease had broken out in Chicopee, Mass., during the previous week. Naturally, my first thought was that this might be an occupational disease of some sort. I had it thoroughly investigated and received a report that the Chicopee infection was similar to the old epidemic of 1888-89, and was not occupational in any degree. The Springfield *Union* of March 21, 1918, notes that the numerous cases of a mysterious malady affecting manufacturing plants turned out to be *only* gripe. There is little or no doubt but that those cases were our first focus of the disease in this country. What happened between the appearance of the disease in Springfield in March and the August outbreak of the epidemic we are at a loss to know. We do know of the outbreak among the boys at the South Boston Pier. Dr. Brooks has told us of its appearance on the training ships of the Shipping Board. Its progress and its travel through the country more recently are familiar to all of you.

I want to tell something about the work at the camp hospital so successfully organized by Dr. Brooks. As he told you, we were all baffled by the nature of the disease. Our bacteriologists, Captains Slack and Overlander, were constantly making analyses from the secretions in the nose, mouth and throat, and obtaining not one germ which seemed to be responsible for the disease, but a variety of germs. Sometimes it was the germ of pneumonia which would occasionally appear forty-eight hours before pneumonia developed. In other cases the patient would develop pneumonia and no typical germ would apparently be present. Secretions from the nose failed to give evidence of Pfeiffer influenza germ such as we have associated since 1892 with the epidemic of 1888. That specific bacillus has been practically wanting not only among the cases in Massachusetts

but among those also reported throughout the country. The most typical germ found has been that of pneumonia, and this was not often found in the secretions of the nose and mouth, but by puncturing the lungs, when we would find Types I, II or III.

So that we have, in all probability, in this epidemic, a mixed infection. There is no unanimity of opinion to-day as to what type of bacteria — pneumococci, streptococci, etc. — causes this disease. One peculiarity of the disease is the occurrence of hemorrhages of the nose, the back part of the throat and of the skin. In the lungs we find that the blood vessels are plugged with clot after clot until frequently the area behind the clots was so disabled that it was only a case of a few hours before a large area of the lung was completely occluded from use. The result was that patients quickly became cyanosed. My first thought was carbon monoxide gas poisoning. All the characteristic symptoms of gas poisoning were present, — plugging up of the blood vessels, hemorrhages of the lungs and congestion which prevented the purifying of the blood by oxygen. The blocked areas were frequently in the center of the lung and not readily detected by physical examination.

Medically we have been able to establish certain definite facts which have a public interest, — namely, rather than, as formerly, looking to the temperature curve as a guide to the condition of the patient, we watched the pulse and respiration. We have seen patients die with normal temperature but with pulse and respiration that never came down to normal. On the other hand, patients have become well with temperatures of 105 and 106 but whose pulse and respiration never went very high. We have made this one great contribution to medicine, — namely, that if you wish to guide your patient safely through the crisis, you should watch the pulse and respiration rather than pay attention exclusively to the fever and, secondly, consider each case of influenza a potential case of pneumonia.

Relative to sanitation in the camp we had this problem. It was a civil community, and those knowing Corey Hill can imagine the prejudice we had to meet and the difficulty of trying to establish military discipline. These difficulties were met

and overcome by Colonel Brooks, and the camp successfully established. From the minute the camp was opened no person was allowed to enter the camp without a pass and only under military escort. No one was allowed in the hospital streets without a mask. In the end we succeeded in carrying through nine other camps under similar military discipline, — at Ipswich, Brockton (Fig. 1 and Fig. 2), Fayville, Gloucester, Lawrence, Haverhill, Waltham, Barre and Springfield.

Certain interesting facts developed in establishing such



FIG. 1. BROCKTON CAMP — CONVALESCING PNEUMONIA PATIENTS.

camps in civilian neighborhoods. In the location of such camps, instead of depending on the old-fashioned military latrine, we tapped the sewer and located the latrine in such a way that the sewer became our catchbasin. Ordinary house toilets were fitted over the sewer.

There has been criticism that our patients were out in the cold and wet, exposed to inclement as well as clement weather. That was part of the treatment. But the tents were properly ditched, and the ground under and around them was perfectly dry at all times. Instead of having a floor in the tent we had

a wooden run which came in between the beds so that the nurses, orderlies and doctors could walk in on dry boards from the street, and they could be mopped off frequently and dried. By rolling up the sides of the tents the sun could get in, and the grass remained green under the tents well into September. What other evidence is necessary that conditions were satisfactory? Under the old style of military camp hospital we would have put down floors, the grass would have been destroyed, dampness would have collected under the floors and not been recog-



FIG. 2. INFANTS' WARD — BROCKTON CAMP.

nized until the tents were re-pitched and the site changed. By doing away with the floors we were able to keep the tents in the same location where first pitched. In order to protect the patients from dampness, a paper sheet was put on to the spring of the bed and also over the patient, and instead of loading them with three or four blankets we simply gave them one blanket, a paper blanket and a very light covering over that. Even on the coldest nights they said they were perfectly comfortable. In crises, hot bricks or metallic bottles were used to give addi-

tional heat. All the nurses and orderlies on duty during cold nights were supplied with what were termed pneumonia jackets, made of padded paper and worn under the sweater. On very wet and disagreeable days early in September, rubber boots and coats were furnished by the Shipping Board for nurses, doctors and orderlies, so that it can be seen that no unnecessary exposure to inclement weather was demanded, and nothing was left undone for the comfort of the nurses and orderlies serving us.

Another innovation was the incinerator. Ordinarily in military hospitals this is constructed with a good deal of detail, expense and labor, and so that it will look well. Our problem had to be solved very quickly as a patient died practically before we could make a diagnosis, and it was thought necessary to burn everything which had come in contact with him. Bricks were placed around the hole of the incinerator and the head of an iron bed was laid on these bricks to form a grate, and we continued to use this device during our stay in that camp. This improvised incinerator proved very satisfactory. To erect a supplementary kitchen we took the side rails of the beds, parallel to each other, and laid two short ones across. This served admirably for boiling the water which we kept on hand all the time for disinfecting materials and dishes.

We separated influenza cases from pneumonia cases. One of the observations made at our camp, as stated before, was that every case of influenza is a potential case of pneumonia, and the sooner this is recognized the sooner the death rate from pneumonia will begin to diminish. It was from acting on that belief that our camps attained the low mortality which we can claim for our treatment. Whereas we got only 351 cases of influenza we had something like 120 pneumonias. We were always looking for pneumonia, and by taking those precautions that we would use for pneumonia cases, such as looking after the pulse and respiration carefully, we were able to anticipate cases of true pneumonia. Two very competent bacteriologists, Dr. Slack and Dr. Overlander, were with us constantly, making all sorts of investigations, which we have included in our reports to the state.

The experience at Corey Hill served as a training school for

doctors and nurses and orderlies, which has been used throughout the state and in other states of this union. Dr. Brooks could have told you of calls from other states, asking that we send so-called "Brooks Units," in order to combat this disease then making its appearance in other localities. By the training we gave nurses and orderlies at Corey Hill many lives have been saved, and, as the Public Safety Committee has said, the work done in these various camps has saved the state 10,000 lives. We were at the camp something like six weeks, and then went to other cities and towns and established there similar camps. The Corey Hill per cent. of deaths was 10.25 of those treated, and the per cent. of deaths of those seriously ill among the boys on the training ships was but 3. At the Cooke Hospital in Chicago, one of the finest in the country, during this epidemic there was a mortality of 31 per cent., yet the editorial read by your chairman would seem to indicate that they think they got out of it very lightly indeed, while we have a death rate of 3 and 4 per cent., at some camps, our highest running to but 16 per cent. You must also realize that 39 per cent. of the cases in this high death rate died within the first twenty-four hours.

Most of the cases received at our hospital were boys between eighteen and twenty-four years, supposed to have been physically fit. They had been struck down like little children. This disease has no respect for the strong, nor for sex. The belief that one attack guarantees immunity from another is not sustained by any investigation that has seemed worth while. Some contend that the fact that so many young people contracted it this time whereas elderly people who might have had it in 1888-89 escaped, is significant. This opinion is not confirmed, however, by trustworthy investigation. The disease spreads by personal contact. All pandemics have followed travel, and only so fast as travel goes; in the East with the speed of the caravan; in European countries in accord with their interchange between countries; in this country more rapidly because we are less severe in our restrictions on travel. All authorities seem to agree on this fact, -- it passes from person to person, either by direct contagion, by droplets, sputum, sneezing, etc.

Now, briefly as to prophylactics. Dr. Brooks described the

masks. Gauze is the best thing known for straining the air from influenza germs. By observation we have found that the corners of the mouth form a perfect incubator for germs, and if the mask is removed and then put on wrong side out the result is often disastrous. Dr. Brooks therefore advised, on the second day of our camp, that we use an old-fashioned tea-strainer with the handle removed and bent to fit over the nose and cover the mouth. This was covered with several layers of gauze. First we tried treating the gauze with medicated powder, but this made the wearer sneeze and cough, just what we were trying to avoid. We did not require the patients to wear masks because they were already struggling for air, and we did not want to cut off any air with two or three layers of gauze. It is important that the mask should fit properly and be so arranged that it covers the mouth but has no opportunity to touch the lips or nostrils. Every two hours the doctors, nurses and orderlies are required to go to headquarters and drop the mask into boiling water and then receive a new mask which is handed out through another opening in the same building so that the recipient does not need to go into the building. The gauze removed and disinfected is used in sputum bags attached to the beds of the boys. One of the most helpful devices we have discovered is the pinning of an ordinary manila bag to the patient's pillow and then giving the boys some of the used gauze for expectoration, after which they drop the gauze into the bags and the whole thing is later burned up. Another precaution which was insisted upon was the washing of the hands. In the streets between the tents were tables with basins containing a 1/1000 solution of corrosive sublimate solution, and before nurses or orderlies could go to mess they had to report at headquarters and under supervision wash their hands in this solution. One hears a great deal about vaccine which might prevent influenza, and of experiments which have been performed. One experiment in our state was most conclusive. Secretions were taken from the noses of two well-authenticated cases of influenza at the Chelsea Naval Hospital and three hours later taken down to the Island where nine men had volunteered for the experiment. The secretion was injected into the noses of these men but not one of them con-

tracted influenza. Secretary Daniels recommended that these men be recorded as heroes to the cause of preventive medicine. There is a great deal of local enthusiasm at present with regard to the use of vaccines. The laity seems to have concluded that if they get a dose of the anti-influenza vaccine they are free from danger of contagion and need not take precautions. The United States Government is now talking of combating that false sense of security, and in a report recently received the U. S. Public Health Department states that the use of vaccine for preventive purposes does not yet seem to be justified by the results. It is yet experimental.

The data obtained on the use of pneumonia antitoxin is somewhat more conclusive. The experiments made on Navy men with anti-pneumonic solution seem to have given splendid results. Out of 12 000 men who have received the solution, practically none have developed the disease. It has, however, this limitation, — that it claims to affect Types I, II and III only; and, secondly, it is the conclusion of those who have used the antitoxin that it must not be given to those having any fever or acute colds. In other words, it cannot be given to any having influenza, in order to prevent pneumonia, as it would in all probability only aggravate the case and precipitate pneumonia. Neither can it be used as a cure after pneumonia has developed. It promises to be an effective preventive of pneumonia.

This history of the disease might be continued almost *ad libitum*, but one thing I do want to emphasize, namely, the great impression it made on those whom we were treating. Many of the boys had never been away from home before; they were in a strange port, having enlisted in a spirit of loyalty. They became ill and were taken away in the night, they knew not where; and what impression did they receive? A quarantine was declared even on letterwriting, in order that the boys might not put pencils in their mouths and thus run the chance of transmitting the disease. Dr. Brooks commanded all letters written by the boys should come to the medical officers for censorship. I was anxious to see how the boys' minds were working, and give the following excerpt from one of the letters:

"*My dear Mama*, — I wonder what you are doing for yourself to-day. I hope that you are all well. Mama, I thought I would write you this morning as I am feeling better. I am in the hospital. I thought at first that I would not write about me being sick, but changed my mind this morning, but Mama don't be uneasy about me for the doctors and nurses are so good. I was brought here yesterday eve. You know when any one gets a bit puny they will send them to the hospital. . . . Mama, there is no place like home when any one is sick, and there is no hand like a dear old Mother's. No one knows how to appreciate a Mother until they get away, but if there was ever a place that could take a place of home this is the place. I hope to be able to go back to my ship in a few days. . . . Mama, don't be uneasy about me for I am well taken care of. What are the little pets doing? Don't tell them about uncle being sick. I wish I could see them. Say, how much cotton haul have you got out. . . . Kiss the little darlings for me and with a big true heart full of love, I am, Your boy. (Discharged well.)"

One difficulty we experienced in other camps established was the obtaining of the necessary doctors and orderlies. These boys now granted a furlough heard the story and all volunteered their services. In every one of the camps our great mainstay has been these boys who gave their services in gratitude for what our state had done for them in their sickness.

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PAPERS AND DISCUSSIONS

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THE INFLUENZA EPIDEMIC AT THE RECEIVING SHIP,
COMMONWEALTH PIER AND THE NAVAL CAMP
AT FRAMINGHAM.

BY LIEUT. R. W. MATHES, ASSISTANT MEDICAL OFFICER, U.S.N.R.F.

(Presented before the Sanitary Section, November 15, 1918.)

It may be of some interest to know a little about the conditions at Commonwealth Pier during the influenza epidemic, as the Receiving Ship was given the credit for being the instigator of the plot. It is generally understood that the first cases came from the Pier, although the disease broke out at the Receiving Ship and at East Boston at practically the same time. It is not to be wondered that the Pier should have had the first cases, as the pandemic traveled from east to west, and we are the Receiving Ship of Boston. Transfers are made to and from us, and no doubt the first cases which came to our attention were in men coming back from across the water. I have been given to understand by some of the officers on duty in France that the epidemic was raging in Brest during June and July, in fact, one officer told me himself that he spent three weeks in the hospital.

The first cases we saw were on August 27, when two men reported as sick. The disease was thought to be influenza of the usual type and character.

I will quote a few figures to show the rapidity with which this epidemic traveled:

August 27, 2 cases; August 28, 8 cases; August 29, 28 cases; August 30, 71 cases; and for succeeding days 61, 92, 104, 80, 11, 23, 13, and so on for quite a period, namely four or five days, when we received a large draft of several hundred men, and then another rise in number started as 15, 43, 39, 27, 17 and 11.

Washington, of course, immediately took cognizance of the fact that we were having an unusually large number of cases, and steps were immediately instituted, in so far as was possible, for relief.

The Receiving Ship has an average daily personnel of from 4 500 to 5 000 men, but transfers and drafts complicate the count, so that between 8 000 and 10 000 men frequently pass through the Receiving Ship each month.

Commonwealth Pier having received a more or less black eye, was of course under constant sanitary inspection, but there has never been a sanitary or medical officer who has inspected the ship but what he has expressed himself as more than pleased with the sanitary arrangements.

The medical authorities had said that they wanted somewhat to relieve congestion, although, according to the inspectors, the amount of air space, etc., was ample. Consequently, on September 12 a camp was started at the old militia grounds at Framingham, Mass., with a working party of twenty-four men. On September 13, 125 men were on hand to get things in shape, and arrangements were made to procure tents and the necessary other equipment from the various naval supply depots.

It was the purpose to keep the camp open as long as the weather permitted, and it was deemed advisable to do away with the old ditch latrines and to construct latrines which would have a direct connection with the sewer. It was thought the camp could exist until about this date, the 15th of November.

On the following day 1 000 men were sent out, and these were followed by daily drafts of one hundred or more as rapidly as possible. The maximum complement has been 2 800 men as against 1 800 men at the Pier. The average complement for

the week ending September 21 to the week ending November 9 was 2 045, and the average complement during the same period at the Receiving Ship was 2 325. During this period there were 277 cases of influenza at the Receiving Ship, as against 52 at Framingham. Drafts have been received at both stations of men who have been exposed to the infection in various places before their arrival in the First Naval District.

For statistical purposes it may be said that practically the same number of men were quartered at each station, the above figures showing that 11.05 per cent. contracted influenza at the Pier, and only 2.05 at the open-air camp at Framingham.

I believe that this very clearly shows the value of the open-air treatment as a prophylaxis, for, as nearly as we could determine, the men at these two stations before arrival in the district were exposed in equal manner to the infection.

The medical officer was instructed to keep only the mild cases at the Pier, as the facilities were limited to care for such a large number of sick men, not as regards hospital equipment, but as to hospital space. The more serious cases were transferred at once to the Naval Hospital, Chelsea, and to various other hospitals and stations designated by the naval authorities.

I shall not endeavor to speak on the treatment of this disease because only the mild cases were kept under our direct observation. I think the facts as above stated show that the value of open-air treatment cannot be too strongly emphasized when we consider the percentage of those contracting the disease living indoors as compared with those living outdoors.

DISCUSSION.

DR. HARRINGTON. — All of the tent hospitals were modeled on the so-called Brooks No. 1 on Corey Hill. The shack designed by Dr. Brooks and equipped for the treatment of influenza and pneumonia cases — in fact for any case requiring fresh air and sunlight — is so arranged that the side shutters can be let down when storms come from the south or southwest. The rear space provides an eave which permits of the circulation continually of a current of fresh air underneath it. We can now have a series of rooms with but two patients to a room.

Pneumonia patients out in the street become sunburned while receiving treatment. Contrast this with the old-time treatment of piling on blankets, giving hot drinks, shutting out all the air. Now we put them out in the sun and air and get more cures than by any other treatment.

At Springfield the coughing became so distressing that everybody lost their nerve. Dr. Brooks went up there and took 92 cases out of the hospital, putting them in tents. The next day the visiting physicians asked, "What have you done for these boys? They have stopped coughing. I have been here an hour and they haven't coughed at all. It does not seem possible they are the same men." That is how men who were skeptical and inclined to oppose the treatment became converted, — by the results. I have no hesitation in saying that the treatment of pneumonia in the future will be towards the methods established during this epidemic.

ALMON L. FALES.* — Do you consider the war responsible for the epidemic — or, putting it another way, should we have had this epidemic if it had not been for the war?

DR. HARRINGTON. — I do not dare answer; although I have it on pretty good authority that the morale began to break when the soldiers in the German army began to hear that their wives and kinspeople were all being taken down with the disease.

But I do want to say a word of warning. In a medical journal received to-day there is an account from Madrid that the disease has broken out there again, and that warns the rest of the world to be cautious. Madrid is more upset now than it was when 2 000 000 were reported sick with the disease last spring, and the reports from the camps in Europe also show a revival of the disease among the troops on the western front. I am wondering whether we shall not get it again in this country with the coming home of these boys. This is a serious problem, but we have the consolation that Massachusetts is pretty well organized to combat it, under the State Guard and with Dr. Brooks ready to meet the disease once more. I think we are better qualified in this state than is any other state of the Union.

MR. ALBERT MORSE. — Among the other volunteers at

* Of Metcalf & Eddy, 14 Beacon Street, Boston, Mass.

Corey Hill I helped for two weeks. I wonder if you could tell me the reason for one thing I noticed, — that most of the people sick with the disease were heavy people, weighing 200 to 250 pounds. Has the blood pressure something to do with it? Those that died were big, husky men rather than the thin people.

DR. HARRINGTON. — It is a clinical observation that when an athlete does get pneumonia he usually dies, whereas the weakling seems to have more or less antitoxin within him. Blood pressure is not a factor. From observations of 2 000 cases in the Chicago Hospital it has been concluded that blood pressure indicates some kidney disorder.

I want to add that women in a delicate condition should not be allowed to come in contact with people suffering from influenza. Women in a family condition invariably die, the death rate being 100 per cent. These women invariably develop quickly cyanosis. They seem to be more susceptible. From a large grouping of cases in Chicago it has been ascertained that pregnant women have a mortality rate of 47 per cent. There have been some tragedies right here in Boston, where women have paid the penalty with the unborn child.

ALFRED O. DOANE.* — Does spraying have any value?

DR. HARRINGTON. — An infected ear is one of the most common evidences of infection. We apply argyrol ointment (10 per cent.) to the nasal mucous membrane as a preventive, and also use Dobell's solution as a gargle and mouth wash. This is used in nearly every hospital. It is an alkaline solution, and it is well known that germs cannot live so long in an alkaline solution. Nature gives us in the mouth and nose an alkaline solution. It is only when this becomes acid, through fatigue or some disorder, that germs grow in the mouth. Then trouble follows. Spraying and gargling with alkaline solution is of some value. It will not prevent germs but will discourage their growth when they are once in the mouth.

DR. BROOKS. — At Thompson's Island there is a total at the Farm School of about eighty boys. During the height of the epidemic Dr. Bradley, who is in charge, kept the school under

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quarantine. No one was allowed to go near them or mingle with them. Last week, when everything was believed to be all right, some boys were allowed to come up to town.

Yesterday morning Mr. Bradley called me up and gave me these facts. The day before he had had one boy sick, and thought it might be influenza but was not quite certain. Yesterday morning he had 4 cases, last night he had 11, to-night he has 17. The quarantine was allowed to lapse too soon, and they are paying the penalty. The warning of Dr. Harrington is very apt. When the disease begins to decline every one gets careless, and I am afraid we shall have to pay the penalty.

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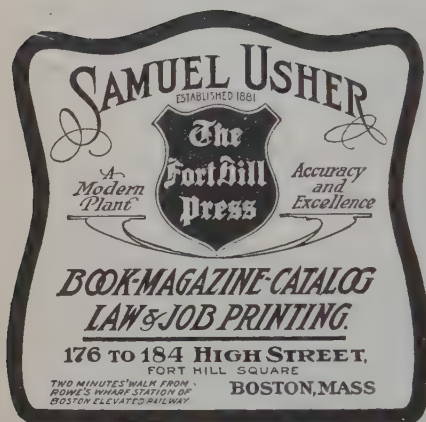
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